

U.S. Patent Application No. 09/833,202
Amendment dated February 16, 2006
Response to Office Action of November 17, 2005

REMARKS

Reconsideration and continued examination of the above-identified application are respectfully requested.

The amendment to the claims further defines what the applicant regards as the invention. Full support for the amendment can be found in the specification and claims as originally filed, for instance, at pages 6 and 7-10 of the present application. In particular, although the Applicant believes that claim 1 as previously written clearly requires an active layer, in order to correct a misunderstanding by the Examiner, claim 1 is amended to unambiguously clarify that an active layer is required. Claim 17 is amended to overcome an alleged lack of antecedent basis. Accordingly, no questions of new matter should arise and entry of the amendment is respectfully requested.

Rejection of claims 17 - 25 under U.S.C. §112, second paragraph

At page 2 of the Office Action, the Examiner rejected claims 17 - 25 under U.S.C. §112, second paragraph, on the alleged grounds that there is insufficient antecedent basis for the limitation "said active layer" in claim 17, line 5. In response, claim 17 is amended so that an active layer is recited as an element of the fuel cell. The scope of the claim is unchanged. Therefore, this rejection should be withdrawn.

Rejection of claim 1 under the judicially created doctrine of obviousness-type double patenting over claims 1 - 2 of U.S. Patent No. 6,881,511

At page 3 of the Office Action, the Examiner rejected claim 1 under the judicially created

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doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 2 of U.S. Patent No. 6,881,511. The Examiner alleged that the claims of the '511 patent encompass the use of a modified carbon product in a metal-air battery, which the Examiner states is a type of fuel cell. For the following reasons, this rejection is respectfully traversed.

Claim 1 of the present invention is dependent on claim 17 and requires a solid electrolyte membrane and requires that an active layer be present that has a thickness of 10 microns or less. Neither of these features are taught or suggested in claims 1 and 2 of the '511 patent. Also, claim 1, because of its dependency on claim 17, requires an active layer having a modified carbon product having an organic group that is proton-conducting. Therefore, this rejection should be withdrawn.

Rejection of claims 1, 3 - 8, 10, 14, 17 -25 under 35 U.S.C. §102(e) over Yu et al.

At page 5 of the Office Action, the Examiner rejected claims 1, 3 - 8, 10, 14, and 17 - 25 under 35 U.S.C. §102(e) over Yu et al. (U.S. Patent No. 6,399,202). The Examiner alleged that Yu et al. shows gas diffusion electrodes containing a modified carbon product, wherein the modified carbon product is a carbon product having attached at least one organic group. Furthermore, the Examiner alleged that the gas diffusion electrodes of Yu et al. are used in fuel cells. The Examiner further alleged that the gas diffusion electrodes prepared with modified carbon material have broad applications and that it would be inherent that a fuel cell should at least include two electrodes and an electrolyte to satisfy mechanical, chemical, and kinetic requirements so as to obtain a fully functional or working fuel cell that converts electrochemical energy into electrical energy. The Examiner further alleged that Yu et al. discloses gas diffusion

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electrodes including carbon supports therefor and in combination with electrocatalyst particles for the preparation of an active layer material. The Examiner alleged that Yu et al. incorporates in its entirety, by reference, the teachings of Dirven et al. (U.S. Patent No. 5,561,000), which shows that a fuel cell is mainly composed of the assembly of a cathode, an anode, and a solid electrolyte membrane between the cathode and the anode. Moreover, the Examiner alleged that the limitation "a thickness of about 5 microns or less" for the active layer means that no active layer is required. For the following reasons, this rejection is respectfully traversed.

Claim 1 is dependent on claim 17. As clarified by the amendment to claim 1, an active layer is present in the gas diffusion electrode or counter electrode or both, and the active layer has a film thickness of 10 microns or less.

The "or less" phrase does not mean zero and the Examiner cannot misconstrue the clear recitation in the claim of an active layer being present. With regard to the Examiner's reference to MPEP 2173.05(c) §II, this section of the MPEP does not support the Examiner's decision with regard to no active layer being present. This part of the MPEP clearly provides an indication that the language used by the applicants in claim 1 would mean that an active layer is present. For instance, in one example set forth in the MPEP, a chemical reaction process is provided as an example with the phrase "be maintained at less than 7 mole percent." The Examiner argued that this would include substantially no ingredient. The Court did not agree because the claim was clearly directed to a reaction process which did not warrant distorting the overall meaning of the claim to preclude performing the claimed process. Similarly, in the present application, an active layer is clearly recited and then the thickness of the active layer is provided. Clearly, providing a thickness of a component clearly recognizes that the component is present and that the numerical

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range is simply quantifying the thickness of the layer. Furthermore, the remaining cases set forth in this MPEP section clearly state that the meanings are based on "the factual situations of the reported cases." In other words, the terminology used in a claim is a fact-by-fact basis. In the present application, clearly an active layer is recited and is present. To avoid repetition of these comments, these comments regarding the Examiner's position on the active layer apply to each of the rejections wherein the Examiner has stated that no active layer can be present based on the thickness recitation. Further, the particular MPEP section relied upon by the Examiner generally refers to amounts of ingredients, whereas in claim 1 of the present application, clearly, an active layer is present and the thickness range simply characterizes the thickness of the active layer. The fact that an active layer is present must mean that it has a certain thickness and this thickness cannot be zero. Those skilled in the art, as well as a common lay person, would clearly recognize this correlation.

With respect to claim 17, this is the only independent claim now by way of this amendment. Claim 1 and all other claims are directly or indirectly dependent on claim 17. Claim 17 recites a fuel cell wherein an active layer is present. A modified carbon product having attached at least one organic group that is proton-conducting is further recited in claim 17. These features are not taught or suggested in Yu et al. Furthermore, Yu et al. does not teach the cell thickness recited in claim 1 of the present application. In addition, Cabasso et al. does not teach or suggest these features. Therefore, claim 1 is not anticipated under 35 U.S.C. §102(e) by Yu et al. Moreover, since Yu et al. does not expressly disclose the limitations of the claimed invention, the Examiner is further requested to note that Yu et al. has been disqualified as a reference to support an obviousness rejection by the showing in the previous Office Action of common

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ownership between the present application and Yu et al. Accordingly, this rejection should be withdrawn.

In Examples 14 and 15, Yu et al. does show mixing specific catalyst particles, namely cobalt porphyrin with a modified carbon product, but Yu et al. does not show the formation of an active layer having a carbon support using modified carbon product(s) that are proton-conducting. Regarding claim 22, Yu et al. does not teach or suggest an active layer formed directly on a solid electrolyte membrane. Accordingly, these claims are also not taught or suggested by Yu et al. Moreover, as noted above, Yu et al. has been disqualified as a reference to support an obviousness rejection by the showing, in the response to the previous Office Action, common ownership between the present application and Yu et al. Accordingly, this rejection should be withdrawn.

Rejection of claims 1 and 17 under 35 U.S.C. §102(e) over Tosco et al.

At page 9 of the Office Action, the Examiner rejected claims 1 and 17 under 35 U.S.C. §102(e) over Tosco et al. (U.S. Patent No. 6,881,511). The Examiner alleged that Tosco et al. discloses gas diffusion electrodes containing modified carbon products wherein the modified carbon product is a carbon product having attached at least one organic group and can be used for at least one component of the electrodes such as the active layer and/or the blocking layer. The Examiner further alleged that Tosco et al. discloses that their invention relates to gas diffusion electrodes such as in metal-air batteries and fuel cells. For the following reasons, this rejection is respectfully traversed.

With respect to claim 17, this is the only independent claim now by way of this

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amendment. Claim 1 and all other claims are directly or indirectly dependent on claim 17. Claim 17 recites a fuel cell wherein an active layer is present. A modified carbon product having attached at least one organic group that is proton-conducting is further recited in claim 17. These features are not taught or suggested in Tosco et al. Furthermore, Tosco et al. does not teach the cell thickness recited in claim 1 of the present application. In addition, Cabasso et al. does not teach or suggest these features. Examples 14 and 15 of Tosco et al. are the same as Yu et al. above. Therefore, this rejection should be withdrawn.

Rejection of claims 1 and 17 under 35 U.S.C. §102(b) over Bolster et al.

At page 10 of the Office Action, the Examiner rejected claims 1 and 17 under 35 U.S.C. §102(b) over Bolster et al. (U.S. Patent No. 4,835,074). The Examiner alleged that Bolster et al. discloses modified carbons and electrochemical cells containing the same, that the chemically modified carbon is used as an electrode for energy consuming cells including fuel cells, and that the modified carbon includes alkyl, alkoxy, aryl aralkyl in its chemical formula. The Examiner further alleged that the electrochemical cell includes a cathode, an anode, and an electrolyte wherein at least one electrode comprises the modified carbon material. The Examiner further alleged that the limitation "a thickness of about 5 microns or less" for the active layer means that no active layer is required. For the following reasons, this rejection is respectfully traversed.

With respect to claim 17, this is the only independent claim now by way of this amendment. Claim 1 and all other claims are directly or indirectly dependent on claim 17. Claim 17 recites a fuel cell wherein an active layer is present. A modified carbon product having attached at least one organic group that is proton-conducting is further recited in claim 17. These

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features are not taught or suggested in Bolster et al. Furthermore, Bolster et al. does not teach the cell thickness recited in claim 1 of the present application. Furthermore, none of the chemical substituents set forth in Bolster et al. would be proton-conducting and, therefore, Bolster et al. does not teach or suggest a modified carbon product having an organic group that is proton-conducting or electron-conducting. Accordingly, this rejection should be withdrawn.

Rejection of claims 1 and 17 under 35 U.S.C. §102(b) over Oswin

At page 11 of the Office Action, the Examiner rejected claims 1 and 17 under 35 U.S.C. §102(b) over Oswin (U.S. Patent No. 3,077,508). The Examiner alleged that Oswin discloses a fuel cell electrode comprising a bi-porous carbon plate having a catalytically activating metal chemically bonded therein, the carbon plate being formed by carbonizing an ion exchange resin containing metal ions upon the surface of a porous compacted carbon plate, wherein the cation exchange resin contains carboxyl groups, and that Oswin also discloses the fuel electrode, the air electrode and the electrolyte, and the use of catalytic material in a carbon support. The Examiner further alleged that the limitation "a thickness of about 5 microns or less" for the active layer means that no active layer is required. For the following reasons, this rejection is respectfully traversed.

Oswin does not teach or suggest any fuel cell comprising an electrode that comprises at least one modified carbon product. In Oswin, it is described that the starting material for forming an electrode may be a cationic or anionic exchange resin that contains a metal ion, but as acknowledged by the Examiner, the carbon plate of Oswin is formed by carbonizing the exchange resin. The electrode material formed by carbonizing would not contain attached organic

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groups, because the carboxylic groups that may have been present in the exchange resin would be pyrolyzed in the carbonizing step. Oswin does not start with carbon materials. With respect to claim 17, this is the only independent claim now by way of this amendment. Claim 1 and all other claims are directly or indirectly dependent on claim 17. Claim 17 recites a fuel cell wherein an active layer is present. A modified carbon product having attached at least one organic group that is proton-conducting is further recited in claim 17. These features are not taught or suggested in Oswin. Furthermore, Oswin does not teach the cell thickness recited in claim 1 of the present application. As noted above, Oswin is formed by carbonizing and therefore does not contain attached organic groups. Accordingly, this rejection should be withdrawn.

Rejection of claims 1 and 17 under 35 U.S.C. §102(b) over Swathirajan et al.

At page 11 of the Office Action, the Examiner rejected claims 1 and 17 under 35 U.S.C. §102(b) over Swathirajan et al. (U.S. Patent No. 5,316,871). The Examiner alleged that Swathirajan et al. discloses membrane-electrode assemblies for electrochemical cells, particularly, fuel cells and that the fuel cells include first and second electrodes and a solid polymer electrolyte membrane. The Examiner further alleged that each electrode is adhered to a respective one of the first and second membrane surfaces and that each electrode comprises a respective group of finely divided carbon particles, finely divided catalytic particles supported in internal and external surfaces of the carbon particles and a proton conductive material intermingled with the catalytic and carbon particles. The Examiner further alleged that the carbon groups contain carboxylic groups on the carbon surface. The Examiner further alleged that the

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limitation "a thickness of about 5 microns or less" for the active layer means that no active layer is required. For the following reasons, this rejection is respectfully traversed.

Swathirajan et al. does not teach or suggest any fuel cell comprising an electrode that comprises at least one modified carbon product having attached at least one organic group. Contrary to what was suggested by the Examiner, this limitation is not met by the description in col. 12, lines 60 - 65 of carbon particles that have surface carboxylic groups, which only indicates an oxidized surface and does not indicate an attached organic group. With respect to claim 17, this is the only independent claim now by way of this amendment. Claim 1 and all other claims are directly or indirectly dependent on claim 17. Claim 17 recites a fuel cell wherein an active layer is present. A modified carbon product having attached at least one organic group that is proton-conducting is further recited in claim 17. These features are not taught or suggested in Swathirajan et al. Furthermore, Swathirajan et al. does not teach the cell thickness recited in claim 1 of the present application.

Accordingly, this rejection should be withdrawn.

If there are any questions or concerns, the Examiner is encouraged to contact the undersigned by telephone.

CONCLUSION

In view of the foregoing remarks, the applicant respectfully requests the reconsideration of this application and the timely allowance of the pending claims.

If there are any fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37

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C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,



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